Abstract for ESMI Annual Meeting (Heraklion, Crete, Greece)

Title: Contact angles of Microellipsoids at Fluid Interfaces

Authors: Stijn Coertjens[§]*, Paula Moldenaers[§], Jan Vermant[§‡], Lucio Isa[¶]

[§]*Department of Chemical Engineering, KU Leuven, B-3001 Leuven, Belgium*
[‡]*Department of Materials, ETH Zürich, CH-8093 Zürich, Switzerland*
[¶]*Laboratory of Interfaces, Soft Matter and Assembly, ETH Zürich, CH-8093 Zürich, Switzerland*
** Presenter of this talk*

Abstract:
The wetting of anisotropic colloidal particles is of great importance in several applications, including Pickering emulsions, filled foams, and membrane transduction by particles. However, the combined effect of shape and surface chemistry on the three-phase contact angle of anisotropic micrometer and submicrometer colloids has been poorly investigated to date, due to the lack of a suitable experimental technique to resolve individual particles. In the present work, we investigate the variation of the contact angle of prolate ellipsoidal colloids at a liquid–liquid interface as a function of surface chemistry and aspect ratio using freeze-fracture shadow-casting cryo-SEM. The method, initially demonstrated for spherical colloids, is extended here to the more general case of ellipsoids. The prolate ellipsoidal particles are prepared from polystyrene and poly(methyl methacrylate) spheres using a film stretching technique, in which cleaning steps are needed to remove all film material from the particle surface. The effects of the preparation protocol are reported, and wrinkling of the three-phase contact line is observed when the particle surface is insufficiently cleaned. For identically prepared ellipsoids, the cosine of the measured contact angle is, in a first approximation, a linearly decreasing function of the contact line length and thus a decreasing function of the aspect ratio. Such a trend violates Young–Laplace's equation and can be rationalized by adding a correction term to the ideal Young–Laplace contact angle that expresses the relative importance of line effects relative to surface effects. From this term the contribution of an *effective line tension* can be extracted. This contribution includes the effects that both surface chemical and topographical heterogeneities have on the contact line and which become increasingly more important for ellipsoids with higher aspect ratios, where the contact line length to contact area ratio increases.